REMARKS

Reconsideration of this application, based on this amendment and these following remarks, is respectfully requested.

Claims 1 through 25 and 27 through 31 remain in this case. Claims 1, 4, 7, 8, 11, 15, 16, 18, 19, 23, 28, and 29 are amended. Claim 26 is canceled.

Claim 15 was objected to because of improper dependency. Claim 15 is amended as suggested by the Examiner, obviating the objection.

Claims 1 through 3, 6 through 9, 11 through 14, 17 through 20, 22 through 25, and 27 through 30 were rejected under §103 as unpatentable over the Carnevale et al. reference[1] in view of the Payne et al. reference[2]. Claims 4, 5, 15, 16, and 26 were rejected under §103 as unpatentable over the Carnevale et al. reference in view of the Payne et al. reference, and further in view of the Zhang et al. reference[3]. Claims 10, 21, and 31 were rejected under §103 as unpatentable over the Carnevale et al. reference in view of the Payne et al. reference, and further in view of the Kramer reference[4].

Claim 1 is amended to overcome the rejection. Amended claim 1 is directed to a method for encoding data associated with a page within a non-volatile memory. The method of amended claim 1 now requires that the error correction code (ECC) calculations on the first segment of the page are performed according to a first ECC algorithm to encode the first segment, and that the ECC calculations on the second segment of the page are performed according to a second ECC

[1] U.S. Patent No. 6,353,910 B1, issued March 5, 2002 to Carnevale et al.
[2] U.S. Patent Application Publication No. US 2003/0099140 A1, published May 29, 2003 on an application filed by Payne et al. on September 27, 2002.
[3] U.S. Patent No. 6,662,333, issued December 9, 2003 to Zhang et al., on an application filed February 4, 2000.
[4] U.S. Patent No. 6,182,239, issued January 30, 2001 to Kramer.

algorithm. This amendment to claim 1 is clearly supported by the specification,[5] and as such no new matter is presented by this amendment.

The method of claim 1 provides important benefits in the encoding of data as it is stored in a flash memory. Specifically, the ability to use different ECC codes provides great flexibility in the optimizing of error correction performance, for example in the storage of information of differing sensitivity to error, and improved efficiency in using more complex ECC operations only to the extent necessary for the desired error correction capability.

Claims 4, 7, and 8 are amended for consistency with the amendment to claim 1 and with the specification.

Applicants submit that amended claim 1 and its dependent claims are patentably distinct over the applied references, on the grounds that the combined teachings of the references fall short of the requirements of amended claim 1, and that there is no suggestion from the prior art to modify those teachings in such a manner as to reach the claims.

The Carnevale et al. reference nowhere discloses the use of different ECC algorithms in the encoding of its data blocks within a page. Rather, the reference uses the same ratio of ECC bits to data bits (*e.g.,* one ECC byte for each four data bytes[6]) for each data block within the page. To the extent that the Carnevale et al. reference mentions the use of "various ECC techniques",[7] this mention refers to the use of various ECC techniques over the entire device, as indicated by the example given of one ECC byte for each eight data bytes.[8]

The other references provide no teachings in this regard. The Payne et al. reference encodes its entire page (*i.e.,* after the XOR combinations) according to a single ECC algorithm

[5] *See* specification of S.N. 10/679,000, page 14, lines 2 through 5; page 15, line 29 through page 16, line 4; page 20, line 29 through page 21, line 3.
[6] Carnevale et al., *supra,* column 3, lines 14 and 15.
[7] *Id.,* column 4, lines 10 through 12.
[8] *Id.,* column 4, lines 12 through 17.

and function to derive the ECC bytes 22 for the page 18 to be stored in the flash memory.[9] The Zhang et al. and Kramer references also lack any teachings in this regard.

Applicants therefore respectfully submit that the combined teachings of the references fall short of the requirements of amended claim 1, because none of the references disclose the performing of error correction code calculations on first and second segments of a given page according to first and second ECC algorithms, respectively, as required by claim 1.

Nor is there any suggestion from the prior art to perform ECC calculations on first and second segments of data in a page according to different ECC calculations. None of the references provide any hint that different ECC algorithms may be used over different portions of data within the same page.

Accordingly, Applicants submit that amended claim 1 and its dependent claims are patentably distinct over the prior art of record in this case.

Claim 11 is also amended to overcome the rejection to it and its dependent claims. Claim 11 is directed to a memory system including a non-volatile memory that includes a page with a data area and an overhead area. The system of amended claim 11 now requires code devices for performing ECC calculations according to a first ECC algorithm on a first segment of the page, and for performing ECC calculations according to a second ECC algorithm on a second segment of the page. As discussed above relative to amended claim 1, no new matter is presented by this amendment. And the system of amended claim 11 now provides additional advantages over conventional non-volatile memory systems, especially in the optimization of the error correction coding for different portions of data, perhaps having different sensitivity to error, within a single page.

Claims 15, 16, 18, and 19 are amended for consistency with the amendment to claim 11, and with the specification.

[9] Payne et al., *supra*, Figure 2; paragraphs [0030], [0033].

Applicants submit that amended claim 11 and its dependent claims are patentably distinct over the applied references, on the grounds that the combined teachings of the references fall short of the requirements of the claim, and that there is no suggestion from the prior art to modify those teachings in such a manner as to reach the claims.

As discussed above, the Carnevale et al. reference lacks any teachings regarding the use of different ECC algorithms in the encoding of its data blocks within a page, instead showing use of the same ratio of ECC bits to data bits for each data block within the page. The mention, in the Carnevale et al. reference, of "various ECC techniques"[10] refers to the use of various ECC techniques over the entire device, rather than to first and second segments within a single page as claimed. The Payne et al. reference also lacks teachings in this regard, teaching instead the encoding of its entire page according to a single ECC algorithm and function. The Zhang et al. and Kramer references also lack any teachings in this regard. Accordingly, Applicants submit that the combined teachings of the references fall short of the requirements of amended claim 11 and its dependent claims.

The prior art also provides no suggestion to modify these teachings to perform ECC calculations on first and second segments of data in a page according to different ECC calculations. None of the references provide any hint that different ECC algorithms may be used over different portions of data within the same page.

Accordingly, Applicants submit that amended claim 11 and its dependent claims 12 through 22 are patentably distinct over the prior art of record in this case.

Claim 23 is also amended to overcome the rejection. Claim 23 is also directed to a memory system including a non-volatile memory that includes a page having a data area and an overhead area. Amended claim 23 also requires means that perform error correction code (ECC) calculations according to a first ECC algorithm on a first segment of the page, and that perform ECC calculations according to a second ECC algorithm on a second segment of the page. As discussed above relative to amended claims 1 and 11, no new matter is presented by this

[10] Carnevale et al., *supra,* column 4, lines 10 through 12.

amendment. The system of amended claim 23 provides similar advantages in the optimization of the error correction coding for different portions of data, perhaps having different sensitivity to error, within a single page, as discussed above.

Claim 26 is canceled, and claims 28 and 29 are amended, for consistency with the amendment to claim 23 and with the specification.

Applicants submit that amended claim 23 and its dependent claims are patentably distinct over the applied references because the combined teachings of the references fall short of the requirements of the claim, and because there is no suggestion from the prior art to modify those teachings in such a manner as to reach the claims.

As discussed above, the Carnevale et al. reference fails to disclose the use of different ECC algorithms in the encoding of its data blocks within a page. In this regard, the reference instead shows only using the same ratio of ECC bits to data bits for each data block within the page. While the Carnevale et al. reference mentions "various ECC techniques"[11], this statement refers to the use of one of various ECC techniques over the entire device; there is no disclosure or suggestion to use different ECC techniques within a single page as performed in the system of amended claim 23. The Payne et al. reference also teaches only the encoding of entire pages according to a single ECC algorithm and function. The Zhang et al. and Kramer references also lack any teachings in this regard. Accordingly, Applicants submit that the combined teachings of the references fall short of the requirements of amended claim 23 and its dependent claims.

Nor does the prior art provide any suggestion to modify these teachings to perform ECC calculations on first and second segments of data in a page according to different ECC calculations. There is no hint or motivation in the prior art to use different ECC algorithms may be used over different portions of data within the same page of a memory, as performed by the system of amended claim 23.

[11] Carnevale et al., *supra,* column 4, lines 10 through 12.

Accordingly, Applicants submit that amended claim 23 and its dependent claims 24, 25, and 27 through 31 are patentably distinct over the prior art of record in this case.

For these reasons, Applicants submit that all of the claims now in this case are patentable over the prior art of record.

The references cited by the Examiner as pertinent have been considered, but are not felt to come within the scope of the claims now in this case.

Applicants also wish to bring the references listed on the specified on the enclosed PTO/SB/08 to the attention of the Patent and Trademark Office in connection with this application. These references were only recently cited in the search report of a European counterpart of this application; a copy of that search report is also enclosed. Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office not more than three months prior to the filing of this statement.[12] A copy of the reference that is not a U.S. Patent or Patent Application Publication document is provided.[13]

Each of these references is in the English language, and as such, no additional statement of relevance is provided.[14] By citing these references, Applicants do not admit that any of these references is, or is considered to be, material to the patentability of any of the claims of this application.[15]

Consideration of this information in this application is respectfully requested.

[12] 37 C.F.R. §1.97(e)(1).
[13] 37 C.F.R. §1.98(a), *as amended* effective October 21, 2004.
[14] 37 C.F.R. §1.98(a)(3)(i).
[15] 37 C.F.R. §1.97(h).

For the above reasons, Applicant respectfully submits that all claims now in this case are in condition for allowance. Reconsideration of this application is therefore respectfully requested.

Respectfully submitted,

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